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Guidelines for High-Piled or High-Density Storage

The California Fire Code regulates storage within a building of combustible materials in closely packed piles, and combustible materials on pallets, racks, or on shelves where the top of the items being stored is greater than twelve (12) feet in height. High-pile combustible storage also includes certain high-hazard commodities such as rubber tires, Group A plastics, flammable liquids, idle pallets, and similar commodities where the top of the storage is greater than six (6) feet in height.

Consideration of the existing fire sprinkler system is important because the existing system may not be capable of protecting this type of storage adequately. Sprinkler systems may also be under-designed if storage of highly-flammable commodity classifications is proposed. Highly flammable commodity includes plastics (nylon, polyester, polypropylene, rubber). Plastic commodities burn with higher temperatures and thus require higher water flow in the fire sprinkler system design when these commodities are concentrated in high piled storage or in mobile storage racks that create a solid pile of storage. When a commodity exceeds 15% plastic it then falls under a more flammable commodity classification.

Compliance Solutions:

The California Fire Code requires Extra Hazard 1 and Extra Hazard 2 design area protect a minimum of 2,500 sq. ft. If the classification is Extra Hazard 2 this results in a water demand of 1,000 gallons per minute.

As an alternative design, the National Fire Sprinkler Code (NFPA 13) permits a “Room Design Method” which provides that a fire rated compartment to be constructed. The fire resistance rating is dependent on the amount of plastic material content of the commodity. This approach allows the greatest use of the existing fire sprinkler system piping and results in the maximum possible storage flexibility for the retailer, while maintaining Fire Code compliance.

Architects designing high-pile or high-density storage systems shall:

1. Obtain a commodity classification report is prepared by a Fire Protection Engineer or NICET Level 4 certified sprinkler designer.
2. Determine whether the existing sprinkler density and water flow are sufficient to meet Fire Codes given the quantity, configuration, and flammability of the commodities.
3. If the sprinkler density and water flow cannot meet the Fire Code, utilize the Room Design Method using a minimum of a 90 minute fire compartment between the storage and retail areas with a higher sprinkler density in the compartment. Note that depending on the configuration of the room being upgraded to a “fire compartment” other building components can be affected,

such as ducting that runs through the room and the addition of smoke detection for automatic door closing.

Plans shall include the following:

1. Dimensioned or scaled floor plan of the entire building and site showing:
a. Locations and dimensions of high-piled storage areas.
b. Aisle dimensions between each storage array.
c. Location and size of fire department access roadways.
d. Location, size and spacing of all doors into the storage area.
e. Location of sprinkler riser and all valves controlling the water supply of ceiling and in-rack sprinklers.
f. Location of Knox Box.
g. Location of Fire Department sprinkler connection.

2. Dimensional or scaled enlarged typical rack or shelving plans and sections or elevations showing:
a. Usable storage height for each storage area.
b. Number of shelves or number of tiers within each rack, with vertical spacing between shelves or tiers dimensioned.
c. Dimension and location of transverse and longitudinal flue spaces.

3. A table of commodities being stored, referenced to the floor plan, showing:
a. Size, quantity, location and description of products, packing materials and containers.
b. Size, quantity, and location of items, which are banded or encapsulated.

4. Specifications of the fire protection and smoke removal systems proposed or existing:
a. Sprinkler design density, K-factor and activation temperature rating of sprinkler heads, and pressure at the base of the riser, from existing riser plate or hydraulic calculations.

5. When required by the fire code official, an evacuation plan for public accessible areas and a separate set of plans indicating:
a. Location and width of aisles.
b. Location of exits, exit access doors and exit signs.
c. Height of storage.
d. Locations of hazardous material.

Should you have any questions, please call 408-310-4654 and ask to speak to the Fire Marshal.